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ABSTRACT

This study was conducted to determine if student achievement in seventh-grade mathematics was improved by using the newspaper as a supplemental instructional tool. Three teachers were chosen who taught two regular mathematics classes at this grade level. During the six weeks of the investigation, each instructor used the newspaper as an instructional tool with the textbook in one class and the textbook only for the other class. The objectives for student learning during the period of the study covered tasks including fractions, decimals, currency, and averages. At the end of the six weeks, all pupils were administered the Iowa Test of Basic Skills, M-2, Form 6, 12th level. The primary hypothesis, that students taught with the newspaper would achieve higher means on the test than those limited to the textbook, was supported by the findings. A secondary hypothesis, that the performance of males would be higher than females in each of the treatment groups, was not supported by the data. (MP)

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THE EFFECTIVENESS OF THE NEWSPAPER AS AN INSTRUCTIONAL TOOL TO TEACH SEVENTH GRADE MATHEMATICS CLASSES

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
NATIONAL INSTITUTE OF EDUCATION

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the Faculty of the Graduate School

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By

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Chapter 1

Introduction

Since the time of John Dewey there has been a growing emphasis of the need to make education practical and meaningful. To make mathematical concepts meaningful to seventh grade students has been a difficult task for junior high school teachers. Lesh (1976) stated that concepts can exist at many levels of sophistication. Their applicability is, however, limited to a more restricted range of experiences. Concepts can be dealt with in an intuitive fashion before they are taught in a formalized manner; therefore, students should be encouraged to clarify and gradually refine learned concepts by using them first in concrete situations and then in progressively more abstract settings (Lesh, 1976). In this way, the development of mathematical systems is characterized by an evolutionary process that begins at a relatively primitive intuitive level.

According to Lesh, meaningful concepts are those that can be related in a non-arbitrary fashion to ideas that have been mastered by the learner. One procedure is to establish an organizing framework (advanced organizers) prior to the main instruction. Organizers are the hall mark of good

teaching for introducing learning relevant to the experiences of the student (Hartley & Davies, 1976). Organizers consist of introductory materials that are at a higher level of generality and inconclusiveness than the more detailed material that is to be learned (Lesh, 1976). Hence, any procedure that makes the arrangement of content more obvious and striking can facilitate the learning of meaningful material. Such an approach with its emphasis on understanding has done much to create interest, provide stimulation and permit greater success in arithmetic for students of average and superior mentality. In her experiment with slow learners, Bachrach (1964) used colored chalk and pencils to teach multiplication. She gradually increased the level of difficulty until the students had mastered the concepts. Although no formal analyses were performed, her subjective impression was that different colored numerals made errors more discernible and the students became more conscious of the correct placement of numbers when doing multiplication.

In a study by Sobel (1975) a discovery approach to teaching mathematics was found to be superior to the traditional teaching presentation. It was concluded that the stage should be set for student discovery, regardless of the level of ability of the student, i.e., the discovery approach appeared to motivate the slow learner as much as it

did the average and superior learners. Further, the students seemed to enjoy making the discovery during the learning process.

In a number of basic readers, a shift toward making material applicable to the child's world has been evident (Hagaman, 1964). Hagaman questioned why a similar thrust had not been applied to mathematics. She stated that teachers know that children learn best when they understand the meaning of what they are learning in terms of their own experiences and interest. She (Hagaman, 1964) talked of two kinds of meaning in arithmetic. One was the intrinsic meaning of quantitative relationships which underlie mathematical thinking. The other was the functional meaning which was connected with the child's experiences. Both kinds of understanding were essential to arithmetic teaching. The intrinsic meaning involved the abstractness of elementary mathematics and the functional meaning applied to practical concrete situations (Hagaman, 1964). Some of the published studies that have used instructional tools like colored chalk, commercial games, tricks or class competition, have failed to show significant gains in student achievement.

According to Cheyney and Walker (1975) and Wilson (1976) the newspaper can supply material which is relevant to the experience of the learner. The International Reading

Association has given its support to the efforts aimed at promoting the newspaper as a means of improving reading skills and recognizing it as a valuable resource for reading materials. Cheyney (1975) stated that because of the immense variety of subject matter to be found in the newspaper, all students found something to hold their interest.

Statement of the Problem

The field of education is currently filled with numerous attempts to inspire educators to implement and researchers to study methods of instruction. New methods, devices, and techniques are constantly experimented with in the hopes of improving the quality of education. Therefore, experiments, scientifically conducted, are necessary to study the effects of innovations when implemented.

The purpose of this study was to determine the difference in student achievement in seventh grade mathematics classes when identical concepts were taught by separate methods of instruction. One form of teaching used the newspaper as a supplemental instructional tool to the textbook and the other form of teaching used the textbook only. Students were tested by means of the Iowa Test of Basic Skills, test M-2, form 6.

The proposed empirical study in mathematics was conducted to determine if student achievement in mathematics

was improved by using the newspaper as an instructional supplemental tool to the textbook when compared to using the textbook only. It was implemented in selected junior high schools of the Memphis City Public School System, hereafter to be referred to as the School System.

It was proposed that utilizing the newspaper to teach mathematics would make abstract concepts more understandable to the learner. These concepts are difficult to comprehend by seventh graders but if they are related to the student's every day experiences, they could be made more relevant and easily understood. (Hagaman, 1964; Wilson, 1966; Cheyney & Walker, 1975).

The topical value of the newspaper has an impact on student interest (Cheyney, 1975) which is reflected in student achievement. Frymier (1977) stated that when students are given proper materials to work with, they will be motivated because the materials as well as the teachers were important ingredients for student achievement. He added that the way the materials were used by the teachers to help students was an important factor to consider.

Textbooks, supplementary materials, and instructional tools constitute the second largest item of expenditure in the School System's annual budget. Many school systems spend enormous amounts of money on the use of the newspaper as an instructional tool in the classroom, even though these papers are made available to them at concessional rates

under the Newspaper in Education (NIE) program conducted under the auspices of the American Newspaper Publishers Association (ANPA) and the local newspapers (Diederich & Maskowsky, 1970). To justify this annual expenditure, a series of studies should be designed and conducted that would indicate the effectiveness of the use of the newspaper, whether it be used for teaching vocabulary, reading, mathematics, social studies or any other subject. It is necessary to determine scientifically if the money spent is achieving the purpose of assisting teachers and students in the teaching-learning process.

The importance of the study to education is to determine whether the expenditure now undertaken when using the newspaper as an instructional aid in mathematics classes is justified and whether its continued use in the school curriculum should be advocated. If a significant increase in student achievement in the mathematics classes is indicated, the findings would be sufficient reason to advocate an intensified program in the use of the newspaper in mathematics classes and to consider extending its use to other subjects.

Can students be assisted to comprehend adequately a particular subject matter if they are taught with material which is relevant to their daily experiences? If so, then does the newspaper as an instructional tool in the classroom

help students to understand mathematical concepts more than does the use of the textbook only? Since the newspaper contains knowledge that has implications, if not specific instructional value, for every area of the curriculum, it could be considered to provide learners with relevant study materials.

Hypotheses

On the basis of the available literature, the primary general hypothesis formulated for this study was: Mathematics students taught with the use of the newspaper as a supplemental instructional tool to the textbook in seventh grade mathematics classes would demonstrate higher mean math achievement on the Iowa Test of Basic Skills than would students taught with the textbook only.

Studies in sex differences, done in mathematics classes, have revealed that attitude and achievement are frequently found to be more favorable for the male student than for the female student (Keeves, 1973). From the junior high school level and beyond, the difference in mathematics achievement widens between the male and female students. Keeves makes a reference to the study done by the International Association for Evaluation of Education Achievement in ten countries. The achievement of boys and girls in science and mathematics was examined. It was found that in all the countries studied, sex differences in achievement was consistent from

the junior high school level. The males achieved higher scores than females in both the subjects.

On the basis of these findings, two secondary hypotheses were formulated. Male students will have higher mean achievement than will females. Specifically, in each of the treatment groups, the male students will achieve higher means than female students. Furthermore, the student achievement of females and males in both treatment groups will provide a treatment by sex interaction.

Delimitations

The study was conducted within the constraints found in the operation of a regular school system. Several major delimiting factors are listed below.

1. It was necessary to limit the study to six weeks. One reason was that the school system worked on a six weeks unit. The year was divided into six such units, three per semester. These three were separated by the Christmas holidays.

2. Teachers start the use of the newspaper in the second unit of the Fall semester, each year. As a result, it was decided to commence the experiment to coincide with this schedule.

3. The use of the newspaper was limited to four days each week. On the fifth day, which was Friday, teacher made tests were adminstered.

4. The study was limited to seventh grade mathematics classes only. Title I and applied mathematics classes were not included.

5. Intact classes were used as the unit of analysis and the classes were randomly assigned to treatment. Randomization of subjects was not possible in this classroom situation.

6. Because of the racial composition of the participating classes in both schools, which were 100% black, the results were restricted to black students in public schools.

7. Only female teachers participated in the study. No male teachers satisfied the requirements of teaching at least two classes of seventh grade mathematics.

Chapter 2

Review of the Literature

The present study is an attempt to assess the instructional role of the newspaper in one selected subject area, mathematics. The use of the newspaper as a teaching tool constitutes a significant development in the field of education. However, definitive research on its effect is limited. In discussing the limited scope of studies to date in this area, several researchers felt that the use of the newspaper as a teaching tool had some effect on learning skills of reading (Wilson, 1966; Johnson, 1973; DeRoche, 1975; and Degler, 1978). In any case, additional studies are required to evaluate the effectiveness of the newspaper as an instructional instrument.

In order to provide the background necessary for the development of this research, the review of literature covers two areas relevant to the study: (1) the use of the newspaper in the classroom as an instructional tool and (2) making learning more meaningful for the student. The first part deals with studies done on the use of the newspaper by teachers in schools, by community colleges and by newspaper publishers whose papers were being used. The second part of

the chapter examines past research on making learning meaningful to students. Included in the latter are a variety of investigations where teachers have tried to make mathematics more meaningful to the child by means of number games, advanced organizers, commercial aids or the newspaper. The purpose of these attempts was to relate learning to the child's past experiences.

The Background of Newspaper In Education

Studies on the use of the newspaper are limited in scope and many consist of surveys conducted by teachers who used the newspaper to supplement their teaching strategies. The bulk of these studies are unpublished and are found at the American Newspaper Publishers Association Foundation library in Reston, Virginia. The few experimental studies conducted do not include carefully controlled designs and thus, their findings should be viewed with caution.

In 1956, ANPA sponsored a meeting of newspaper publishers with representatives of the National Education Association, the National Council for Social Studies, the National Council of Teachers of English, the National Association of Secondary School Principals, the American Association of School Administrators and the Association for Supervision and Curriculum Development. The purpose of the meeting was to consider how newspapers and educators could work together in pursuit of accepted educational objectives

without regard to the special interests of the newspaper. The outcome was a decision to study how newspapers were then being used by a national sample of teachers, how widely they were used, and over what period of time. The study, conducted by the educators and supported by ANPA, reported in 1957 that existing use of the newspaper was inadequate in both method and extent but that large numbers of teachers were anxious to learn how to use the newspaper more effectively.

As a result of this meeting, the Newspaper in Education program was initiated two decades ago. Now, 500 newspapers in the United States and Canada are participating in it. Three million students in the kindergarten through the high school level are using 44,600,000 newspapers in 16,000 schools. Ninety thousand teachers are using the newspaper in their classes in elementary and high schools. The program is sponsored by the ANPA and participating newspapers maintain and support their staff at over $2,000,000. The majority of the papers involved in the program have circulation figures from 10,000 to 25,000. Some of these papers have been with the program for more than eleven years. In 1970 the program gained momentum and 36% of the newspapers have been with NIE from one to five years (Newspaper Advertisement Bureau, Inc. Report, October, 1977).

Figures in the Mid-South, Newspaper in the Classroom, The Commercial Appeal, (1979) indicate that 55,000 to 60,000 students in the public, private and parochial schools in Mississippi, Arkansas and Tennessee are in classes where they use the newspaper for various subjects. A total of 700 teachers in the private and public schools teach using the newspaper as an instructional tool. One million two hundred thousand copies of The Commercial Appeal were used in the 1978-79 school year.

The Newspaper as an Instructional Aid

Much of the literature on the instructional utility of the newspaper is expressed in the form of testimonials or proposed teaching methods rather than formal empirical research designed to test the instructional methods. The few empirical studies that have been done suggest positive results in terms of achievement gains. No formalized study has appeared on the nature of measuring achievement gains in mathematics when the newspaper was used as a teaching aid.

Cheyney and Walker (1975) mention that a writer suggested in 1890 that the newspaper would be good for reading at any age level. Therefore, to use it to teach reading would be advantageous to the teacher and they suggested that teachers should be trained for it. The newspaper has been used occasionally as instructional material by teachers who were eager to motivate their

students, but a concentrated effort in this direction was not organized until 1956.

At the time of the start of the NIE program, Wheelan (1969) indicated that the basic problem was the reluctance of teachers to use the newspaper in their classes since they did not know how to utilize it. She suggested continued efforts be made to reach teachers and to test the program to prove its validity and its practical effectiveness. She further stated that the success of the program depended on the participation of the local newspapers in each area. New ideas were needed and that there should be ways she stated, to demonstrate to the teachers that the newspaper was not an addendum or adjunct but an integral part of teaching.

Teachers were unanimous in their opinion about the effectiveness of the use of the newspaper as an instructional tool to improve student achievement (Johnson, 1973; Sparks, 1974; Cheyney & Walker, 1976; and Degler, 1978). They also state that it was an important source of learning and had unlimited possibilities because of the varied material covered in the daily. Betchel (1973) suggested possibilities of teaching mathematical concepts with the use of the newspaper, and as early as 1959, Angus (1959) suggested interdisciplinary work with the help of the newspaper.

Johnson (1973) admitted that NIE had gained a position for itself and to exclude the newspaper from schools would

be to remove the most widely and consistently read piece of literature. The newspaper can have a prominent place in the school curriculum, and the intake from the newspaper can supply additional information to the material found in textbooks. Johnson justifies the use of the newspaper in the classrooms on the grounds that the space age should be reflected in the change in the nature of the material used in schools. It was one of the ways to connect the present with the past, the abstract with the concrete.

The effectiveness of the newspaper as an instructional tool to improve reading skills was investigated by Wardell (1973). She found that student proficiency in distinguishing between fact and opinion and between major ideas and minor details, as well as the total newspaper reading ability, was increased through classroom use of materials based on newspaper writeups. Norman (1977) strongly believed that education could not move in the direction of increased student participation in the learning process without materials condusive to achievement and student interest. It may be pointed out that most of the teachers who have used the newspaper in their classes and studied its effect on student learning stressed newspaper usage as a contributory factor to improved learning.

Echoing the sentiments of Johnson, Barth (1975) found that newspapers helped to keep textbooks up-to-date in many

different subjects and that they offered material that improved reading comprehension and reading skills. He called the newspaper a practical instructional device. Rowe (1977) studied the effect and relative value of the newspaper as a teaching tool. She assessed the instructional role in one subject area and found that students responded in a positive manner to the use of the newspaper. Their interest, motivation and the ability to grasp the concepts and apply reading skills was significantly enhanced through the use of the newspaper as a supplementary teaching instrument.

There was a dissenting note in the work of Reiley (1974). She questioned the value of the NIE program when her analysis of wire copy, which is the main source of national news for most of the smaller newspapers, indicated that the reading level was over the heads of both elementary and high school readers. She stated that the newspaper was useless as a remedial tool.

The Wilson (1966) study used a control group and an experimental group of sixth graders who were taught with the textbook and the newspaper, respectively for one year. They were pretested at the start of the study and post test results showed the experimental group to have an average achievement level of 7.4 in arithmetic when tested with the

SRA Achievement test, which was .5 above the achievement level of the control group.

The Yamakawa and Schuster (1971) study was conducted for 40 hours for a summer reading course. Students from two schools were used and the Nelson Reading Test measured paragraph comprehension. The classes were small, n=15, and the results produced gain scores of over one year. Another summer program directed by Kay Lumley reported results using magazines and newspapers in seven reading centers. The reading levels of 743 thirteen year old students was raised an average of more than one year (Education Summary, November, 1965).

The study by Ross (1977) determined the effect of using the newspaper to teach reading skills to a group of sixth graders with below average ability. The focus was on four reading skill areas. Two reading classes were used as a control and experimental group respectively. Each class averaged below one year grade level according to the results on the Weekly Reader Silent Diagnostic Reading Test, Form J. The post test examination revealed that the experimental group showed achievement in all four skill areas with significant gains in two areas.

Studies by Publishers

Publishers who have their newspapers participate in the NIE program have also conducted studies and surveys. Their

statements were in agreement with those made by the teachers. In such surveys the teachers rated the newspaper extremely high as a teaching tool and as a vehicle to motivate students to learn (Coleman, 1972). The Sun Telegram, San Bernadino, California, sponsored a workshop for teachers of the local schools in 1971 and found the response so overwhelming that it had to be made into an annual feature.

Teachers reported student interest level was much higher for newspapers than it was for the textbooks. The San Francisco Examiner conducted a study in July 1975 and reported that teachers felt the newspaper had great effectiveness in the classroom with all types of students, regardless of their ability, ethnic or social background. Teachers indicated that student interest remained high and reading skills improved with its use at the elementary, junior high and high school levels (prepared by R. G. Consultants, 1975).

The Patriot Evening News, Harrisburg, Pennsylvania did a study to determine if skills and concepts taught by using the newspaper in the lower level tenth grade English classes at a selected high school were retained at a level significant enough for the student to maintain interest in the daily newspaper (Rowe, 1977). The long range success of the NIE program was based on interest sustained in the students

to stimulate ongoing utilization of the daily newspaper in the classes.

In 1977, The Commercial Appeal conducted a survey of schools in Arkansas, Mississippi and Tennessee where the paper was used for teaching purposes. Questionnaires were sent out to teachers in fourteen city schools, four private schools, five in West Tennessee, eight in Mississippi and five in Arkansas. The newspaper staff who conducted the survey concluded that the responses were favorable and suggested that future work should be more extensive.

In recent years the newspaper has been used effectively in junior and community colleges (Pond, 1977). The business schools of these institutions are making a concentrated effort to incorporate the newspaper at all levels. Pond stated that the public press was a valuable resource for community college composition instruction. Its diversity, freshness, accessibility and even its imperfections can be used by teachers. Using the newspaper, Pond found that students could be taught skills of analysis and logical thinking, organization and expression while strengthening their ability to use the public media more knowledgeably.

Making Learning Meaningful

According to Verner and Murphy, (1977) the newspaper's most outstanding quality is its relevancy which gives it wide appeal at all grade levels. It provides material

needed for meaningful learning in all curriculum areas and for all ages (Fairleigh, 1977). The variety of subject matter and its immediacy of interest were strong factors favoring transference from newspaper topics to other fields. Degler (1978) pointed out that through the use of the newspaper in the classroom students were taught to make transfers or connections between meanings in the textbook and meaning in the newspaper. Even though few teachers deny the importance of correlating the present with the past, the concrete with the abstract, not many plan it as a necessary part of their daily assignment or preparation. Classes would have more meaning if students were given time to skim through the newspaper every day so as to relate it to their subjects of study (Johnson, 1973). By transference of learning from the newspaper, students get practice in using the highest order of thinking skills such as inference, analysis, drawing conclusions and transformation (Johnson, 1973; Degler, 1978). According to Johnson, students need to use their thinking processes not only in school but when out of school as well. They should be given practice with relating process to content. Learning comes to life when a student recognizes connections between what she or he already knows and what she or he encounters for the first time (Johnson, 1973).

Teachers should, therefore, provide meaningful topics that the student may recognize and draw upon to make connection with the new topic presented in class. Lesh (1976) stated that instructional material should be meaningful. He defined meaningful topics as those in which new material to be learned was related in a nonarbitrary fashion to ideas that were already mastered by the learner. What is meaningful has to be defined in relation to the individual and what the learning material conveys to the student. Individuals bring very different knowledge structures to a task and it is these structures representing accumulated knowledge, background and current interests that determine how the learned information is used and interpreted. (Anderson, Reynolds, Schallert & Goetz, 1977).

Meaningful learning has been made possible in many ways. One that appeals to the students was found to be the discovery approach (Sicklick, 1975). She arranged a series of tasks or problems on mathematics learning so that certain results became obvious to the students. Sicklick organized the material in such a fashion that the students were allowed to discover the underlying patterns in arriving at the answers. Mathematical games in high school classes could be used in a similar manner (Rowe, 1976).

Students felt that games removed pressure, encouraged teaching by peers, and were a non-threatening evaluation of

learning. Rowe found that students liked to design their own games which gave them practice in using mathematics and applying it to situations created by themselves. Teacher made games, commercial aids, or student-made games, all serve to be a highly motivating medium for learning (Rowe, 1976).

Regardless of the ability level of the student, it was necessary to set the stage for student discovery (Sobel, 1975). The discovery approach in this study was found to be more motivational than the traditional teaching presentation in mathematics classes. Sobel suggested that the classroom teacher should provide the proper atmosphere for learning mathematics by taking into account the basic characteristics and needs of the students. According to him, they function best in a relaxed and unthreatening atmosphere, free of tension and undue competition. Bachrach (1964) was an early contender of emphasis on understanding by the student to permit success in arithmetic. When students understood the arithmetic concepts, they were interested in learning more. She used colored chalk to explain the multiplication concept. Color made the errors more discernible to the learner and made her/him more conscious of correct placement of numbers while working advanced multiplication.

Summary

This review has presented studies on the use of the newspaper in the classroom as an instructional tool and on making learning more meaningful to the student. Drawing from these areas, the intent of the review was to develop the necessary knowledge base for the premise to state that the newspaper provides material relevant to the student's experiences. When material relevant to the learner's experience has been used to teach new topics, it has been found to be effective (Lesh, 1976). Therefore, when the newspaper is used as an instructional tool, it should make learning more meaningful to students, thus aiding in the teaching-learning process.

News items are within the realm of the student's every day life. Students are exposed to these items in their homes through the media and in school through their peers. As a result when such items are used in classroom teaching, the student can relate to those items more closely, draw from past experience and connect that experience with the new material that is taught to them.

Chapter 3

Methodology

The present investigation examined the effectiveness of the use of the newspaper as a supplemental instructional tool to the textbook on student achievement in seventh grade mathematics classes. The teacher and student samples used in the study are described. The procedure observed by the teachers in conducting the experiment and the materials used during the six weeks of the study are detailed.

Teacher Sample

For the selection of subjects and teachers, all seventh grade mathematics teachers in the School System using the newspaper in their regular mathematics classes in the 1978 Fall semester were examined for eligibility to participate in the study. The criterion for the selection of the teachers was that each one taught at least two regular mathematics classes. This ruled out all teachers who taught applied mathematics classes or Title I classes. It also excluded teachers who taught one class of regular mathematics and one class of applied or Title I.

Three teachers were found to satisfy these conditions of teaching seventh grade mathematics classes. They were

two black teachers and one white. They were from two different schools. All three of them had certification in mathematics as required by the State of Tennessee. They had taught the subject in the school system in previous years and had also attended the workshop entitled "Newspaper in the Classroom" at Memphis State University. Two of the teachers had used the newspaper in their mathematics classes, while the third teacher had not used it previously.

During the period of the study, which encompassed six weeks, these teachers used the newspaper as an instructional tool along with the textbook for one class, and did not use the newspaper at all, but used the textbook only, for the other class. These classes were referred to as Groups I to VI for purposes of identification in the study. The participating teachers received an inservice training session under the direction of one of the mathematics consultants of the School System and this researcher. This was done to ensure control over the subject matter being taught and allow for uniformity in the treatment of both types of classes conducted under the experiment. Each teacher was allowed to exercise her initiative within the limits of the study. She was permitted to encourage student creativity, as long as the constraints that applied to the study were observed. For instance, a teacher could not allow a student

to work with the newspaper if the student happened to be in the class that was required to use the textbook only.

Student Sample

Students were seventh-graders enrolled in the mathematics classes in the public school system in Memphis. Six classes were used in the study. Two classes were from one school and the four other classes were from the second school. As a result, one school had one class using the newspaper and one class using the textbook, while the other school had two classes using the newspaper and two classes using the textbook. None of the students in these six classes had used the newspaper after they had changed to the junior high school in the Fall of 1978. Therefore, they were using the newspaper in their respective classes for the first time since they entered their new schools. Each Wednesday students received a copy of the local newspaper, The Commercial Appeal, for the six weeks that the study was conducted. The reason was to encourage independent study and to facilitate drill and practice.

Materials

For selecting materials to be covered during the period of the study, the participating teachers were consulted and it was agreed by all that it was feasible to include fractions, decimals, currency and averages. The following

objectives were formulated at the start of the study. The student will be able to:

1. Add, subtract, multiply, and divide whole numbers.
2. Solve word problems with the use of fractions and whole numbers.
3. Change fractions into decimals.
4. Solve word problems using currency in terms of dollars and cents.
5. Find the average of a set of given scores.

The textbooks for classes were Foster, T.R., Gerardi, W.J., Jones W.L. Key Ideas in Mathematics (1974), Houghton Mifflin & Co. and Kane, R.B., Schaefer, M.N., Wheatley, G.H., General Math I (1977), Houghton Mifflin & Co. All students in the newspaper group used The Commercial Appeal in addition to the textbooks. The teachers supplemented their work in classes taught with the newspaper with the mathematics class cards supplied by The Commercial Appeal. A sample card is reproduced in Appendix A. The cards outline activities that are related to every day items selected from the newspaper. They deal with mathematical abilities and skills and indicate to the teacher how to use the selected newspaper item for teaching a particular concept. The cards also instruct the teacher on how to conduct an activity, what type of questions to write pertaining to the activity and how to evaluate the student performance.

Assessment

At the end of the six weeks, the students were administered the Iowa Test of Basic Skills, M-2, Form 6, 12th level mathematics test. The concepts taught to the students are covered in the 12th level of the test. It was administered in each of the six classes in the study by the researcher. The Iowa Test of Basic Skills was designed to measure children's ability to handle mathematics questions related to current objectives, content placement and emphasis in grades three to nine. The coverage of the Modern Mathematics Supplement devotes less than 10% of the items to measurement of the basic mathematical concepts. Items on number lines, inequalities, and structural properties of number systems are included.

The test consists of six overlapping levels. For example, the last several items of one test form the first few items of the test following it[illegible]e test items are unambiguous according to an evalu[illegible]e by O'Brien (1972, p. 482). Substantial attention [illegible]n given by the testmakers to grade placement of topics and items.

The Iowa Test of Basic Skills was administered in May 1968 to 600 students in each grade in 14 school systems of the Iowa Basic Skills Testing Program. Split half reliabilities ranged from .87 to .91 and correlations between the tests with the Arithmetic Concepts Test of the I.T.B.S.

ranged from .75 to .87. The Manual for Administrators, Supervisors and Counselors (1974) provides standard errors of measurement for the various raw score ranges. They can be interpreted in terms of grade equivalent scores, percentile ranks or stanines from the tables given in the manual.

Procedure

The routine employed by teachers in conducting each of the six classes was as follows:

1. Introduce the concept to the class by verbal explanation and give examples for greater clarification.

2. Work out examples on the board or project them on the overhead projector. Examples for the newspaper groups were given from the newspaper of that particular day. The teachers were ready with the examples to be presented to the class by going over the newspaper before starting the lesson. Students followed these examples from their respective copies of the paper. For the textbook groups, examples were taken from the text being used. Teachers were instructed to keep a balance in the number of examples given to each of the classes during explanation and during practice and drill.

3. Teachers answered questions from the students relating to the concept being covered.

4. After completing the explanation of the concept, the teachers followed it up with the basic skills of

addition, subtraction, multiplication and division of the concept being taught.

During the first two weeks of the project, the classes were taught fractions. The concept was introduced and explained on the first day. For the newspaper groups the teachers used the advertisement on dentures. This was suggested to the teachers by the researcher since it was adaptable to the topic of fractions. The advertisement is reproduced in Appendix A. Students opened their newspapers to the page on which it appeared and heard the explanation. The advertisement stated that the cost of making a whole set of dentures was $99. The teacher explained that the price included the cost of making dentures for the upper jaw and the lower jaw. The same idea was written on the board as $\frac{16 \text{ teeth in the upper jaw}}{16 \text{ teeth in the lower jaw}}$ both put together equal a whole. If a denture was to be made for one jaw only it would be $\frac{16 \text{ teeth}}{32 \text{ teeth}}$. In the same way if 8 teeth were to be made then it would be $\frac{8 \text{ teeth}}{32 \text{ teeth}}$. With this form of progression a whole set of fractions was covered. Once the idea of fractions was made clear, the reduction of these fractions followed. At any time if there were questions to be answered, the teacher took the time to explain it to the whole class.

The lesson continued the next day with more examples given by the teacher who now took news stories and

advertisements from the newspaper to enable students to relate the fractions concept to all different items. Basic skills was taught with the use of recipes. The teacher pointed out a recipe given in the paper and asked the students to reduce it for serving one person. Similarly, she asked the class to increase the amount to be sufficient to feed the whole class. Next, they were made to work out a full meal with five courses to be served to the entire class. The last assignment combined all four basic skills using fractions. For further drill and practice the teacher pointed out items to be used and the students worked, either individually or in groups. Those students who had difficulty at any stage of a computation would go to the teacher's desk and ask for help. During each concept, whether it was fractions, decimals, currency, or averages a class drill was conducted. At that time a problem was assigned and the students worked it out, a step at a time on the board. Each student would be given a chance to make one computation that would be included in the final answer. If the student made a mistake the class would indicate the correction. This practice was observed in all six classes. However, the problem assigned to each class might differ depending on what the teacher had picked out for her particular class. The amount of practice and drill for each

class was the same the difference was in the material used for the newspaper groups, and the textbook groups.

In the third week of the study, decimals was introduced with numerals shown in the paper by means of a dot between figures. This is one form of notation of prices usually found in newspapers. Examples of the materials used in the classes are included in Appendix A. The other form of notation used in the newspaper is a combination of large and small type print to express dollars and cents. This form was used in the lessons on currency. Examples are attached in Appendix A.

The concept of fractions was then applied to decimals. The teacher emphasized the meaning and use of the decimal point and the place where it appeared in the figures. The prices along side the photo frames (see page 56) were whole numbers and part of the next number. This was to make clear the fact that on either side of the decimal point were two different types of figures. Thus .99 was read as $\frac{99}{100}$. The teacher, next, called out the figures appearing in this advertisement and the students identified the whole numbers and fractions in each case. When the separation of the whole numbers from the partial numbers were sufficiently clear to the students, the teacher proceeded with the basic skills starting with addition. When each of the four skills was covered, there would be practice and drill and finally a class activity.

Decimals led in to currency, and the difference between the two concepts was indicated by the way the notations were made for each one. The combination type print was chosen for currency because of such usage in writing bank checks. Currency was easily explained since the students had used it at one time or another and they all knew that a dollar had 100 cents. The meaning of figures like 154^{35} and 146^{23} was explained first (see page 57). Examples of more such figures appearing with the electrical gadgets advertisement was given to the students for correct identification (see page 57). Once they could differentiate the dollar and cent values, they were made to add and subtract these figures. For instance, if a car was bought on which the monthly payments were 154^{35} what would it cost to pay for four months? Or if a washer and dryer cost 196^{66} and 174^{99} respectively what would three pairs of these items cost? Using many other items, the teacher gave continued practice and drill for the whole week that the concept was taught.

The last concept taught was averages. This began in the fifth week. Many students are interested in ball games and they keep up with scores of many teams. These scores were used to teach averages. The teacher started a discussion on a team of players regarding the number of games won, the number of games lost and the number yet to be

played. The next topic was the scores made in the games won and in the games lost. Taking these scores she made them find out the average score for the games won and the average score for the games lost. These average scores were compared to see if the winning score average was greater or less than the average score for the games lost. The weather chart was used next. During November and December snow had fallen in many parts of the country while Memphis still enjoyed cool temperatures. Because of this factor the students worked on the average temperature for a particular day and then compared it with any city to determine the difference. The Mississippi River flood stage column was suggested by the students. They totalled the figures for all the cities given in the paper and calculated the average flood stage. From this figure they determined the city that was more in danger than the others.

In the last week, which was the sixth week, when all concepts were covered, a review time was allowed for each of the six classes. On the Friday of the sixth week, the students were administered the Iowa Test of Basic Skills.

Design

The analytical design of the study was a partial hierarchial one between-one within-groups method. Such designs are appropriate to use when there is reason to suspect that intact groups influence data (Kennedy, 1977).

Two methods of instruction comprised the major independent variable. In one method the teachers used the newspaper as a supplemental instructional tool, and in the other method they used the textbook only. The second factor, student sex, operationalized as females and males, constituted the within group variable. The effect of the treatment was examined on student mathematics achievement, which was the dependent variable. This variable was measured by the Iowa Test.

In the absence of randomization of subjects, intact classes were used and these were randomly assigned to treatment. Student maturation or a history threat would not prevail in the study because of the short period of six weeks for the study and the use of control and treatment groups. The results of an hierarchial design allows for differences over and above group difference.

Chapter 4

Results

The data collected in this study permit a discussion of the effectiveness of the use of the newspaper as an instructional tool versus the use of the textbook only to teach identical mathematical concepts. The results reveal the effects these treatments had on student achievement. The major dependent variable in the experiment was test scores on the Iowa Test of Basic Skills. Data were analyzed by a hierarchical design employing a one between-one within-groups model. Such designs are appropriate to use whenever there are reasons to suspect that intact groups influence data (Kennedy, 1977). Through this design, sufficient control can be exercised to analyze group performance. Data were compiled on a sample of 157 seventh grade students after they were taught with two methods of instruction. Six classes were used in the experiment. Three classes were taught with the help of the newspaper as a supplement to the textbook and three others were taught with the help of the textbook. Achievement was determined by test performance at the end of a six week treatment period. A 32 item multiple choice test was selected from the 12th level of the

Iowa Test of Basic Skills, form 6. It covered all four concepts taught during the experiment. The last nine questions were based on an illustration that appeared on the top of the page which gave it a close resemblance to the practice given to students in classes using the newspaper as a supplemental instructional tool. A Kuder-Richardson 20 estimate was used to arrive at the internal consistency of the test. The reliability obtained was at .64. A complete summary of the final ANOVA is presented in Table 1. Because of the unequal cell sizes in the experiment, a harmonic (n_h=12.16) was calculated. The unequal n problem was circumvented by adjusting sums of squares by the harmonic mean. The adjusted sums of squares were used to derive the mean squares for the F comparison. The hierarchical strategy provides a more valid, though complicated picture of what is happening in the experiment when compared to the factorial designs that do not take into consideration groups as a unit of analysis.

In examining Table 1, it will be noted that the $F(1, 4) = 219.69$, $p < .001$ associated with treatment effect was significant. F tests for the main effects of treatment and interactions are of considerable interest. With the exception of the significant treatment effect, no other main effects or interactions were significant. The primary general hypothesis formulated for this study was that

Table 1

Summary Table of Analysis of Variance

Source	SS	df	MS	F
A (Treatment)	559.3131	1	559.3131	291.6886
B/A (Groups/A)	7.6703	4	1.9175	.0723
C (Sex)	.0002	1	.0002	.0000
AC	14.0942	1	14.0942	4.1978
BC/A	13.4303	4	3.3575	.1266
S/BC/A (Subjects/ BC/A)	3844.4114	145	26.5131	

*p < .001

students taught with the newspaper as an instructional tool in seventh grade mathematics classes would achieve higher means than students taught with the textbook only. This hypothesis was supported by the findings.

Examining the overall means of the two treatment groups (see Table 2), the performance of groups using the newspaper is much higher than that of groups using the textbook. This pattern applied to both females and males. It may be noted that the mean achievement of the females in the textbook groups was 13.79, whereas, it was 13.15 for the males. In the newspaper condition the mean achievement of the females was 17.09, while it was 17.69 for the males. Examining the means of females in the two treatment groups, it may be noted that females taught with the newspaper achieved a mean of 17.09 and those taught with the textbook achieved a mean of 13.79. A similar trend may be noted in the mean achievement of males in the newspaper group ($\bar{X}$ = 17.69) and males in the textbook group ($\bar{X}$ = 13.15).

A secondary hypothesis was that the achievement of males would be higher than the achievement of females in each of the treatment groups. This hypothesis was not supported by the findings. Although previous studies have found the achievement of males to be greater than the achievement of females in mathematics and science, the results of this study indicated no differences as a function of sex.

Table 2

Descriptive Statistics For Individual Cell Treatment

Textbook Group								
	Females				Males			
Classes	I	II	III	TOTAL	I	II	III	TOTAL
n	10	14	8	32	8	13	19	40
$\bar{X}$	14.10	13.64	13.62	13.79	12.87	13.84	12.78	13.15
SD	4.38	2.44	5.55	3.87	4.05	5.38	4.18	4.92

Newspaper Group								
	Females				Males			
Classes	IV	V	VI	TOTAL	IV	V	VI	
n	12	16	15	43	18	11	13	42
$\bar{X}$	17.00	17.25	17.00	17.09	17.39	17.27	18.46	17.69
SD	6.82	4.17	5.14	5.21	6.03	4.76	7.16	5.99

Summary

The results of this study showed a statistically significant treatment effect $F(1,4) = 291.69$, $p < .001$. Students taught with the newspaper showed higher achievement scores than did those taught with the textbook only. The achievement of females and males was not significantly different, nor did the sex variable interact with treatment. Contrary to other studies conducted on the achievement of females and males in subjects like science, and mathematics, this study did not indicate any difference in the mean achievement of girls and boys. The difference in the means is indicated in those groups taught with the use of the newspaper and those taught with the use of the textbook only.

On the basis of the findings, the primary general hypothesis that students taught with the use of the newspaper would have higher mean achievement than students taught with the use of the textbook only was supported. The other hypothesis, that males would have higher achievement than females in both the newspaper and textbook conditions was not supported by the findings.

Chapter 5

Summary, Conclusions and Recommendations

This chapter contains the summary, conclusions and recommendations for further research, based upon the findings of the study.

Summary

This research is a study of a strategy for helping students to learn abstract mathematical concepts. It was proposed that such concepts are made more meaningful to the child when they are related to individual daily experiences. The newspaper provides items of interest to the students and can, therefore, be an effective instructional instrument. When past experiences are related to new learning, the concepts taught can be more easily understood.

The subjects in this study were 157 seventh grade students in regular mathematics classes enrolled in the School System. Six classes were taught by three female teachers. Each teacher taught one class with the use of the newspaper as a supplement to the textbook and one class with the textbook only. The study was conducted over a period of six weeks which began at the end of October. Four mathematical concepts were covered. They were fractions, decimals,

currency and averages. Fractions were taught in the first two weeks of the experiment. The other three concepts were each taught for one week. The sixth week was left for review of all concepts. On the last day of the study, the classes were administered the Iowa Test of Basic Skills, M-2, form 6, 12th level mathematics test.

A teaching routine was followed by the participating teachers. This was to ensure uniformity in the study. A concept was introduced by verbal explanation given by the teacher. She then worked out examples on the board for the benefit of the class. She answered questions from the students. Next, the class was given drill and practice on the concept just taught. Those groups taught with the textbook were given examples from the text, whereas classes taught with the newspaper were given examples from the day's newspaper. The teachers selected the items that the class was to work with and maintained a balance in the practice and drill given to each of the groups.

It was hypothesized in the study that students taught with the use of the newspaper as an instructional tool would demonstrate higher achievement than students taught with the textbook only. It was further hypothesized that the achievement of the male students in each of the two groups would be higher than the achievement of the female students. Prior studies on the school performance of females and

males have indicated higher achievement by males in subjects like mathemtics and science (Keeves, 1973).

The data collected from the 157 students are analyzed by means of a hierarchical, one between-one within-groups design. The analysis of treatment means indicated significantly higher achievement for groups taught with the newspaper $F(1, 4) = 291.69$, $p<.001$ for the treatment effect. No other variables had a significant F ratio, nor was any interaction indicated for sex by treatment or groups by sex.

The findings from this study support the need to relate new concepts taught to the student's daily experiences. An attempt was made in this study to show that there is an important place for the newspaper in the school curriculum to teach abstract mathematical concepts. The results carry implications for further research to be conducted by theorists, educators and social scientists alike.

The results of this study are similar to the findings obtained by Wilson (1966). His study involved sixth graders who were taught with the newspaper for one year and another group that was taught identical subjects without the newspaper. He found that the group means of students taught with the newspaper and the group means of students taught without the newspaper were 7.4 and 6.9 respectively, which indicates higher achievement by students using the newspaper.

It is, however, unlikely that any one research project can provide an absolute endorsement of either the use of the newspaper to teach mathematics or the use of the textbook only. What appears to be needed is a carefully designed series of studies to determine if the use of the newspaper, the use of the textbook or a combination of both is productive for pupil achievement. Even though this study has provided important insights into the possible differential effectiveness of the two types of instructional methods used by the teachers, additional studies designed to delineate the specific benefits of each in regard to pupils of all ability levels should be undertaken.

The evidence provided in this study suggests that poor academic performance of many students may not be due to an innate ability to understand the concepts but rather to the teaching approach and technique adopted by the teachers in their respective classes. By using the newspaper in the classroom to teach new concepts, an opportunity was provided by the teacher to make the subject matter relevant to the child's past experiences, thus making learning simpler and easier to comprehend. Teachers participating in the study agreed that students who were taught with the newspaper during the experiment evidenced much interest in mathematics. The groups that were taught with the newspaper requested that they be given more practice than was

originally planned. The reason for this request may be due to the topical items found in The Commercial Appeal which were used to explain the new concepts taught to the class. Students participating in the study did not know of the project for which they were selected. Howver, the teachers knew about the study, which was unavoidable, since they had to be consulted and briefed before the start of the study. The expectancy of teachers was one factor which could not be controlled and their enthusiasm could very well have influenced test treatment results. The study started at the end of October, which put the classes in an advantageous situation to get material that would not normally appear during other times of the year. Features, news stories and advertisements for Thanksgiving and Christmas were abundant.

On the strength of other studies conducted to compare females and males in mathematics achievement, it was predicted that males would achieve higher than females. However, contrary to that prediction, the achievement of both sexes was not different in this experiment. A logical explanation that follows is that female and male students taught with the newspaper may have been highly motivated if they felt that concepts were made meaningful to them. Explaining new concepts by means of items found in the newspaper may have helped the students to comprehend the subject matter since they could draw from their past experiences.

An examination of means for females and males in the newspaper condition revealed a slight advantage for the latter. The reverse tendency, however, was revealed in the textbook condition (i.e., females > males). Although the treatment by sex interaction did not reach significance ($p < .20$), the suggestion remains that newspaper examples for all concepts may not have been geared to feminine interest. Comparing the means of the females in the newspaper groups with those in the textbook groups indicates that the achievement of the former was much higher. Thus the benefits of using the newspaper applied to females as well as males. There is the possibility, however, that if females were given feminine oriented examples from the newspaper, their achievement might be improved over what was found in this study. Only additional studies conducted along these lines can provide data to substantiate this statement.

Generalizations of the results of this study will be limited because of the localization of the schools, the nature of the composition of the students and the small sample size used in this experiment. Generalization can be made only to public schools in larger cities.

Recommendations

The problem the study investigated was to determine the effectiveness of the newspaper to teach seventh grade

mathematics concepts. It is assumed that when these concepts were related to the child's daily experiences through the newspaper items they were made more meaningful and thus assisted in the teaching-learning process. The recommendations resulting from the conclusions have implications for further research. Certain recommendations seem warranted in the light of informal commentary from the newspaper groups and their attitude in class.

1. It is recommended that a series of studies be carefully designed for each class level beyond the seventh grade through the senior high school classes. The need for this suggestion is to determine if the newspaper, when used as a teaching tool, will be consistently effective in all the grades.

2. This study was conducted in the Fall when there was a considerable variety of material published in the newspaper due to the holiday season. Similar studies need to be conducted in other periods to discern if the range of material available at those times allows for comparable instructional benefits.

3. Under the present study, one teacher taught both methods of instruction, thus posing a threat to internal validity. In order to avoid a carry over of explanation of concepts by the teachers, it is recommended that studies be undertaken with different teachers teaching each method of

instruction. A random selection of the teacher sample should be used along with a random assignment of groups to treatments.

4. It may also be revealing to conduct studies using newspaper examples geared to feminine interest to teach mathematics to see if girls achieve higher than boys when taught with items relating to clothing, fashions, home decorations and nutrition.

5. It may be recommended that an appropriate testing instrument be designed suited for studies conducted to use the newspaper as an instructional tool to teach mathematics or science.

6. Lastly, it may also be recommended that similar studies be conducted in private and parochical schools and in the public schools which have an enrollment of students from the middle and higher income families. Such studies may reveal the possible effectiveness of the newspaper as a teaching tool for all types of students or only for a certain type.

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